

Name \_\_\_\_\_  
Date \_\_\_\_\_

Teacher \_\_\_\_\_  
Section \_\_\_\_\_

## Geometry Unit 13: Circles 2009-2010

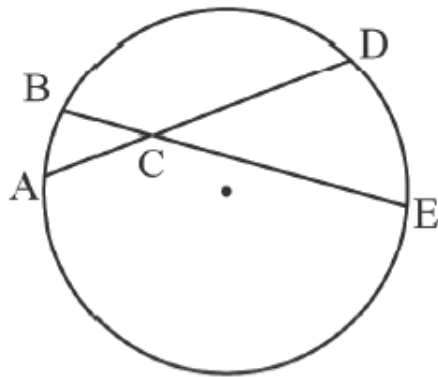
Instructions: Select the appropriate response for each multiple choice item.

For items that are not multiple choice, show your work and/or justify your response.



1.

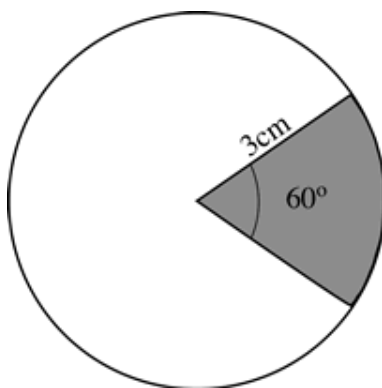
If  $BC = 5$  and  $CE = 12$ , then possible lengths for segments  $AC$  and  $CD$  are:



- A. 6 and 10
- B. 5 and 7
- C. 7 and 12
- D. 12 and 13

2.

This circle has a radius of 3 centimeters and a central angle with a measure of  $60^\circ$ .



What is the area of the shaded sector?

- A.  $3.14 \text{ cm}^2$
- B.  $4.71 \text{ cm}^2$
- C.  $9.42 \text{ cm}^2$
- D.  $28.26 \text{ cm}^2$

3.

Jason was investigating some interesting properties of his favorite insignia which is shown below:

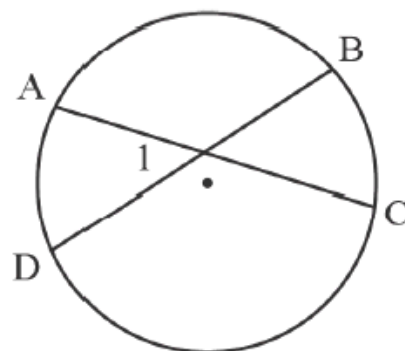


Jason decides to recreate this insignia as a drawing on a poster. He knows that the arc intercepted by  $\angle A$  and  $\angle C$  should measure  $80^\circ$ . Which could be the measures of  $\angle A$  and  $\angle C$ ?

- A.  $\angle A = 80^\circ$  and  $\angle C = 160^\circ$
- B.  $\angle A = 40^\circ$  and  $\angle C = 80^\circ$
- C.  $\angle A = 40^\circ$  and  $\angle C = 40^\circ$
- D.  $\angle A = 80^\circ$  and  $\angle C = 40^\circ$

4.

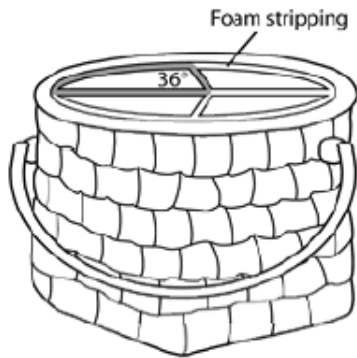
If  $m\angle 1 = 50^\circ$ , then possible measurements for  $\widehat{AB}$  and  $\widehat{CD}$  are:



- A.  $40^\circ$  and  $90^\circ$
- B.  $140^\circ$  and  $120^\circ$
- C.  $35^\circ$  and  $15^\circ$
- D.  $60^\circ$  and  $40^\circ$

5.

Alex is adding a piece of foam stripping to the perimeter of the pie shaped opening of his mom's sewing basket shown below.



If the circular top has a diameter of 14 inches and the central angle of the sector is  $36^\circ$ , how many inches of stripping, rounded to the nearest tenth, does Alex need to cover the perimeter of this sector? Use  $\pi = 3.14$ .

- A. 29.4
- B. 18.4
- C. 15.4
- D. 4.4

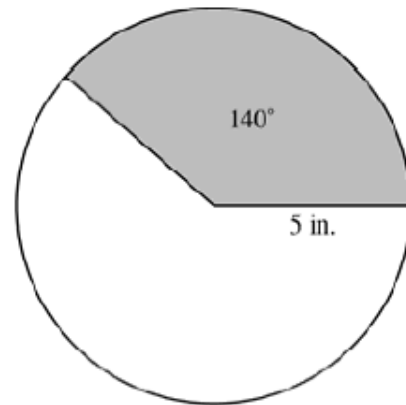
6.

After a rain shower, Jonathan noticed a rainbow and realized it looked just like part of a circle. The rainbow appeared to be like which part of a circle?

- A. circumference
- B. diameter
- C. arc
- D. chord

7.

Which is closest to the area of the shaded sector, in square inches?



- A. 12
- B. 79
- C. 31
- D. 122

8.

This table lists a comparison of measures of central angles and inscribed angles of circles to their intercepted arcs.

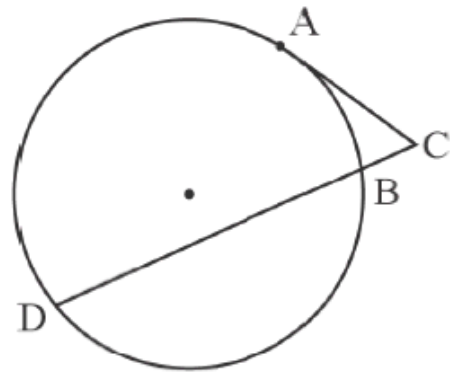
Measure of Central Angle	20°	30°	100°	125°
Measure of Inscribed Angle	10°	15°	50°	62.5°
Measure of Intercepted Arc	20°	30°	100°	125°

Based on the data in this table, which of the following can you conclude about inscribed and central angles?

- A. The measure of inscribed angles equals the measure of central angles.
- B. If a central angle and an inscribed angle have the same measure, they intercept equal arcs.
- C. Inscribed angles intercept arcs that are the same number of degrees.
- D. If an inscribed angle and a central angle intercept the same arc, the inscribed angle is half the measure of the central angle.

9.

$\overline{AC}$  is tangent to the circle below. If  $AC = 10$ , then possible measurements for  $\overline{BC}$  and  $\overline{BD}$  respectively are:



- A. 15 and 5
- B. 4 and 5
- C. 5 and 20
- D. 4 and 21

10.

Students in groups were given various sized quadrilaterals inscribed in circles and were told to measure the four angles of the quadrilateral. Angles of the quadrilaterals were numbered consecutively. The results are shown below.

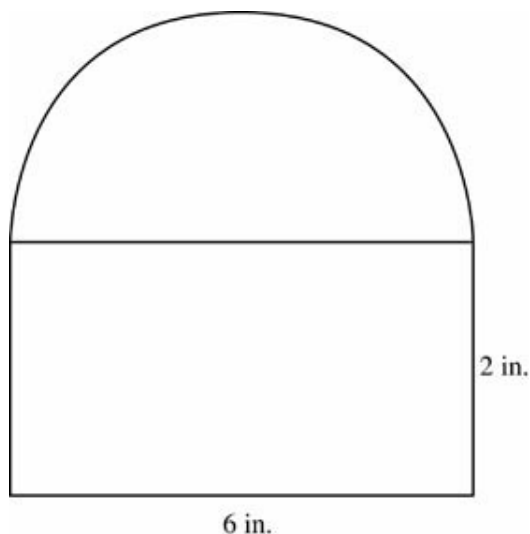
	$\angle 1$	$\angle 2$	$\angle 3$	$\angle 4$
Group 1	42°	42°	138°	138°
Group 2	45°	90°	135°	90°
Group 3	100°	80°	80°	100°
Group 4	115°	65°	65°	115°
Group 5	30°	75°	150°	105°

What conclusion could be made about the angles of a quadrilateral inscribed in a circle?

- A. Two of the angles are always congruent.
- B. Opposite angles are supplementary.
- C. Consecutive angles are supplementary.
- D. Consecutive angles are congruent.

11.

What is the total area of this composite figure below?



- A.  $(12 + 3\pi)$  square inches
- B.  $(12 + 6\pi)$  square inches
- C.  $(12 + 4.5\pi)$  square inches
- D.  $(12 + 12\pi)$  square inches

12.

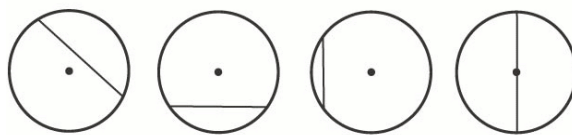
While rolling her coins into wrappers, Jan noticed that her coin stacks looked like cylinders, even when they weren't stacked completely straight.



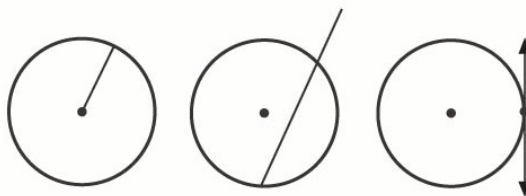
Are all circles similar? Justify your answer.

13.

Each of the following shows examples of chords on a circle.



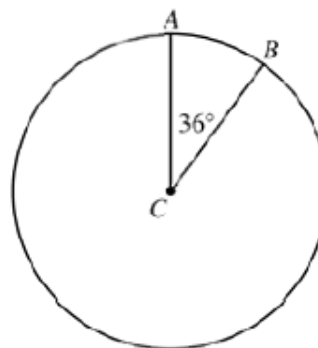
Each of the following is NOT an example of chords on a circle.



Write a definition for a chord on a circle.

14.

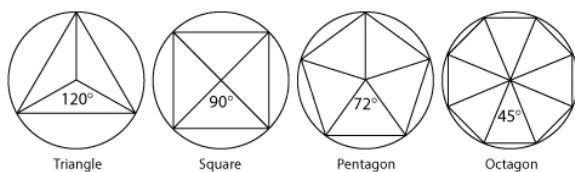
The circumference of the circle shown below is 60 units.



What is the approximate length of arc AB?

**15.**

The measure of the central angle for each of the four regular polygons is shown below.



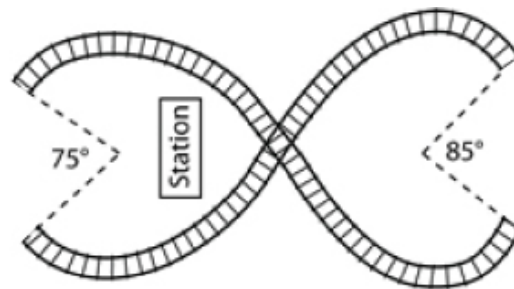
Write an expression that best represents the measure in degrees of the central angle of a regular polygon having  $n$  sides?

**16.**

Draw an example of a line secant to a circle.

**17.**

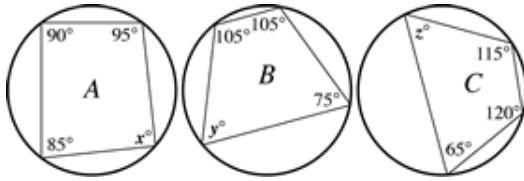
Ted is designing a miniature railroad station layout as shown below. The missing portions of the track represent the arcs of two congruent circles. Each circle has a radius of 10 inches. The central angles of these sectors are  $75^\circ$  and  $85^\circ$ .



How many inches of curved track will Ted need to complete the missing part of his model station layout if he rounds the length to the nearest inch.

18.

The diagram below shows three inscribed quadrilaterals and their interior angle measures.



A. Complete the table below for each of the polygons.

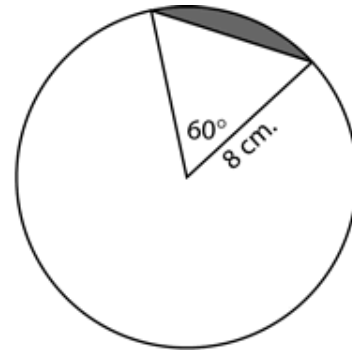
Quadrilateral	Expression	Sum
A		$180^\circ$
B		$180^\circ$
C		$180^\circ$

B. Based on the information from your table, write equations, then solve for  $m\angle x$ ,  $m\angle y$  and  $m\angle z$ .

C. What is the sum of all interior angles in any convex quadrilateral?

19.

The circle below has a radius of 8 centimeters with a central angle measure of  $60^\circ$ .



Find the shaded segment of the circle. Show work for each step of the solution.

A. Calculate the area of the circle.

B. Calculate the area of the outlined sector.

C. What other calculations are needed to find the area of the segment?

Show your work in finding this area.

D. What is the area of the segment?

20.

Write a rule that expresses the relationship between the number of sides of a regular polygon and the measure of each central angle using the table below.

Measure of each Central Angle	Number of Sides
120	3
90	4
72	5
60	6
	$n$

21.

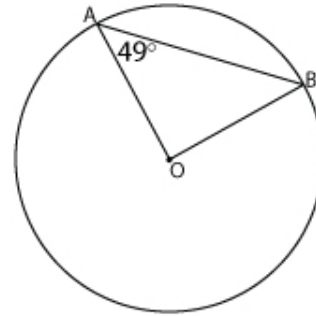
The minute hand of a clock in a clock tower has a length of 36 inches.



If a butterfly landed on the extreme tip of the minute hand at exactly 12:00 noon and rode the minute hand until 12:45 p.m., how far did the butterfly ride along the arc traced by the minute hand? Round your answer to the nearest foot.

22.

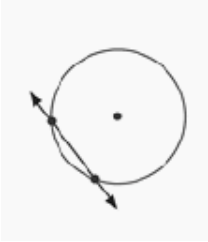
In the figure below, O is the center of the circle.



Find the measure of  $\angle AOB$  and give a justification for your answer.



Answer Key

#	Item ID	Key	TEKS	Stimulus
1	MG1092486D	A	G.9C	-
2	M0G3049934	B	G.8B	-
3	MG1092480D	B	G.9C	-
4	MG1092484D	B	G.9C	-
5	MG1092492D	B	G.8B	-
6	MG1092474D	C	G.9C	-
7	MG1092488D	C	G.8B	-
8	MG1092467D	D	G.5B	-
9	MG1092482D	A	G.9C	-
10	MG1060728RX	B	G.9B	-
11	M0G3023089	C	G.8A	-
12	MG1092462D	<p>Yes, all circles are similar. Linear measures of all circles are proportional.</p> $C_x = \pi d_x$ $\frac{C_x}{d_x} = \pi$ <p>The ratio of any circumference to any diameter will be equivalent to pi, <math>\pi</math></p>	G.2B	-
13	M0G00070RX	A chord is a segment whose endpoints are both located on the circle.	G.9C	-
14	MG1092490D	approximately 6 units	G.8B	-
15	MG1092465D	$\frac{360}{n}$	G.5A	-
16	MG1092478D		G.9C	-

#	Item ID	Key	TEKS	Stimulus
17	M0G3049916	28 inches	G.8B	-
18	M0G3069541	See attached Rubric or Checklist	G.2B	-
19	M0G3043455	See attached Rubric or Checklist	G.8B	-
20	M0G00068RX	360/n	G.9B	-
21	M0G3061667	14 feet	G.8B	-
22	MG1092470D	$82^\circ$ Justification: Since AO and OB are radii of the circle, they are congruent. That means triangle AOB is isosceles and angle ABO is also $49^\circ$ . Since the sum of the angles of a triangle must be $180^\circ$ , then angle AOB must equal $180 - 98$ or $82^\circ$ .	G.2B	-

**Checklist List**

**18)**

A.

Quadrilateral	Expression	Sum
A	$90^\circ + m\angle x$ $85^\circ + 95^\circ$	$180^\circ$
B	$105^\circ + 75^\circ$ $105^\circ + m\angle y$	$180^\circ$
C	$115^\circ + 65^\circ$ $120^\circ + m\angle z$	$180^\circ$

- B.  $90^\circ + m\angle x = 180^\circ$ ;  $m\angle x = 90^\circ$   
 $105^\circ + m\angle y = 180^\circ$ ;  $m\angle y = 75^\circ$   
 $120^\circ + m\angle z = 180^\circ$ ;  $m\angle z = 60^\circ$

C.  $360^\circ$

**19)**

A. Area of circle =  $3.14 \times 64 = 200.96$  sq cm

B. Area of sector =  $\frac{200.96}{6} = 33.49$  sq cm

C. Area of triangle =  $4 \times 4\sqrt{3} = 27.71$  sq cm

D. Area of shared segment =  $33.49 - 27.71 = 5.8$  sq cm

**Rubric List****18)**

<b>3</b>	The response shows full understanding of the essential mathematics applicable to the task and a sound approach toward solution that includes logical reasoning and appropriate conclusions. Computation and procedures used are generally accurate, but the response may contain minor computational or procedural flaws that do not detract from evidence of full understanding.
<b>2</b>	The response shows a satisfactory understanding of the essential mathematics applicable to the task, but reasoning may not be completely clear, and there may be minor flaws in computation and/or use of procedures as a result of carelessness or non-essential misunderstandings. The flaws do not detract from evidence of satisfactory understanding. A score of 2 may also be earned if the response is partially correct but some aspect of the task is omitted.
<b>1</b>	The response indicates limited understanding of the essential mathematics applicable to the task. While an effort is made to address the task, omissions and/or errors related to insufficient mathematical knowledge or incorrect application of skills or procedures bring into question that student's ability to deal successfully with tasks of this type.
<b>0</b>	The response indicates no understanding of the essential mathematics applicable to the task, or there is no response.

19)

3	The response shows full understanding of the essential mathematics applicable to the task and a sound approach toward solution that includes logical reasoning and appropriate conclusions. Computation and procedures used are generally accurate, but the response may contain minor computational or procedural flaws that do not detract from evidence of full understanding.
2	The response shows a satisfactory understanding of the essential mathematics applicable to the task, but reasoning may not be completely clear, and there may be minor flaws in computation and/or use of procedures as a result of carelessness or non-essential misunderstandings. The flaws do not detract from evidence of satisfactory understanding. A score of 2 may also be earned if the response is partially correct but some aspect of the task is omitted.
1	The response indicates limited understanding of the essential mathematics applicable to the task. While an effort is made to address the task, omissions and/or errors related to insufficient mathematical knowledge or incorrect application of skills or procedures bring into question that student's ability to deal successfully with tasks of this type.
0	The response indicates no understanding of the essential mathematics applicable to the task, or there is no response.

22)

<b>3</b>	The response shows full understanding of the essential mathematics applicable to the task and a sound approach toward solution that includes logical reasoning and appropriate conclusions. Computation and procedures used are generally accurate, but the response may contain minor computational or procedural flaws that do not detract from evidence of full understanding.
<b>2</b>	The response shows a satisfactory understanding of the essential mathematics applicable to the task, but reasoning may not be completely clear, and there may be minor flaws in computation and/or use of procedures as a result of carelessness or non-essential misunderstandings. The flaws do not detract from evidence of satisfactory understanding. A score of 2 may also be earned if the response is partially correct but some aspect of the task is omitted.
<b>1</b>	The response indicates limited understanding of the essential mathematics applicable to the task. While an effort is made to address the task, omissions and/or errors related to insufficient mathematical knowledge or incorrect application of skills or procedures bring into question that student's ability to deal successfully with tasks of this type.
<b>0</b>	The response indicates no understanding of the essential mathematics applicable to the task, or there is no response.